New York University Tandon School of Engineering
Computer Science and Engineering
Course Outline CS 6083: Principles of Database Systems
Fall 2024

- Section A: Monday 2:00 pm to 4:30 pm,
  Jacobs Academic Bldg Room 475 Loc: Brooklyn Campus
- Section INET:
  via asynchronous zoom with synchronous zoom option

Professor Phyllis Frankl
pfrankl@nyu.edu
Pronouns: She, Her

Tentative Office hours:

- In person Mon 5:00 to 6:00
- zoom: Thurs 5:00 to 6:00
- by appointment
- Note: I'll establish some protocol for students to let me know whether they're coming to the scheduled office hours

TA office hours will be posted on BrightSpace.
Any changes to Prof Frankl's office hours will be announced on BrightSpace

Please use EdStem for questions about course material and logistics. Link will be provided soon.

Course Pre-requisites
Good programming skills, familiarity with basics of operating systems, familiarity with discrete math topics (including sets and relations) and knowledge of basic algorithms and data structures (including sorting, search trees, and hashing). Ideally, you should have taken a course on data structures or algorithms, and a course on operating systems, at the graduate or undergraduate level.

Course Description The course aims to give a broad introduction to relational database systems, including the Entity-Relationship model, the relational data model, query languages, index and file structures, query processing and optimization, and transaction management. The workload of the course is expected to be above average.

Course Objectives :
At the conclusion of the course student should have:

- Ability to design databases using the ER model and converting to the relational model
- Ability to write queries in relational algebra, relational calculus, and SQL

- Ability to design and implement a moderate sized web-based database application
- Understanding of indexing, including B+ trees and hashing
- Ability to analyze performance of various query processing algorithms and understanding of the rudiments of query optimization
- Understanding of transaction management, including the ACID properties, concurrency management goals and protocols and rudiments of recovery

Course Structure

Most of the material will be presented in weekly lectures. Reading assignments from the text book and six homework assignments will reinforce this material. Students will be required to learn to use a database management system (MySQL or Oracle) and to write web application code through self-study; pointers to resources and some basic instruction for this will be provided. Lecture notes, recordings, and announcements will be posted on NYU Brightspace. Please check every day or two for updates. Homework assignments will be posted on Gradescope and should be handed in on Gradescope.

Hybrid format: Section A is in-person and Section INET is online. I will record the Section A lectures on Zoom with screen-sharing and post the recordings for the INET section (and review for Section A). I will post Zoom links for INET section students who wish to attend synchronously. Our classroom is also equipped with lecture capture, which will provide another way to view the lectures. Students in either section will have a choice between taking exams online using the Respondus Lockdown Browser and Monitor or in-person during class time. Several time slots will be available for the online exam near the date /time of the in-class exam.

We will use EdStem for Q&A and discussion. **If you have a question about logistics or material, please post it there, rather than e-mailing the professor or TAs.** If your question is a general question, please post it for everyone to see. You may post anonymously if you prefer. If you know the answer to a classmate's question, feel free to answer. If your question reveals parts of your answer to a homework problem or the project, please post it on EdStem directed it to the prof and TAs.

If you do need to e-mail me (e.g. regarding issues other than the course material or logistics) please include CS-GY 6083 in the subject line and remember to include your name and which section you are in in the body of the e-mail.

Readings

The recommended text for the course is:
Database System Concepts
Seventh Edition

Avi Silberschatz, Henry F. Korth , S. Sudarshan
McGraw-Hill
ISBN 9780078022159
http://www.db-book.com/
Copies are on reserve in the library.
The vast majority of the material covered in the course is also in the 6th edition
ISBN 0-07-352332-1

Please refer to the tentative schedule and read the referenced sections of the textbook before and/or after the corresponding lectures. Note that small revisions to this schedule may be made. The homework dates shown there are approximate; actual deadlines will be provided when homework assignments are published. There is some material that is covered in those textbook sections that will not be covered in the lectures. Unless otherwise noted, exam questions will be drawn from topics covered in the lectures and/or the assignments; when reading the textbook after lectures, you may skim or skip topics that were not addressed in lectures, unless otherwise noted.

Course requirements

Tests: There will be one midterm exam and a cumulative final exam. If your performance in the class has been reasonably good and you are satisfied with your grade, you will have the option of doing a less “high stakes” final activity in lieu of the final exam.

Course project: A programming project involving design and implementation of a web database application. This will require substantial effort. The project will include ER model; relational database design; design, implementation, and testing of application code for the business logic and user interface. Implementation should be in Python, C#, or Java with MySQL or Oracle. (Other host languages or DBMS may be allowed, but please check with me first.)

You will be responsible for mastering enough SQL, HTML, and Python/Flask (or Java/JDBC/Servlets, or other acceptable host language) to allow you to do this project. An overview of Python Web/Database modules will be presented, but self-study will also be expected. You may do the project alone or with one or two classmates. Team projects will have additional requirements.

The project will be done in three parts through the semester and will be based on specifications provided. In some cases you will use solutions provided for earlier parts as the basis for later parts.

Homework assignments will reinforce the material covered in the lectures and in the textbook. Some will be “paper and pencil" exercises and some will involve programming in SQL. For those problems that involve programming, style guidelines will be distributed and style and clarity will count toward your grade.

Unless noted otherwise, you may work with one or two other students on the homework assignments. *However, It is essential that you participate in developing and checking the solutions and that you understand them. It is unlikely that you will do well on the exams and the project if you do not understand how to solve problems like the homework exercises. Many of the exam questions will be based on concepts from the homework assignments.* If I feel that you are abusing the permission to work on homework in a group, I may withdraw this privilege. I strongly recommend that students who opt to work on the homework with others try to solve the problems individually and then discuss your proposed solutions with your group.

Grade Calculation

Grades will be computed roughly as follows:

- Exam grade =
    - 0.65*(your better exam) + 0.35*(your worse exam)
      OR for those who opt-out of the final exam:
    - **if** optional final activity is satisfactory then midterm score
      else 0.8*midterm-score
- Final score: Exams: 50%, Project 25%, Homework 25%.

Tentative dates for exams and homework/project due deliverables, as well as lecture topics and associated readings are on the tentative schedule.

Diversity, Belonging, and Inclusion

NYU is committed to creating an inclusive and equitable environment for all students. In this class, I aim to cultivate a strong sense of community, emphasizing that it is a space where individuals of diverse backgrounds—spanning beliefs, ethnicities, national origins, gender identities, sexual orientations, religious and political affiliations, and abilities—are treated with respect. All members of the class are expected to contribute to an inclusive atmosphere for each other. While disagreement and differing ideas are welcome, the expectation is that we respect perspectives beyond our own, even when they diverge from our personal beliefs or experiences. If you encounter disrespect or discrimination in the class or feel that the outlined standards are not being upheld, please report your experiences to me.

Moses Center Statement of Disability
If you are student with a disability who is requesting accommodations, please contact New York University's Moses Center for Students with Disabilities (CSD) at 212-998-4980 or mosescsd@nyu.edu. You must be registered with CSD to

receive accommodations. Information about the Moses Center can be found at www.nyu.edu/csd. The Moses Center is located at 726 Broadway on the 3rd floor.

NYU School of Engineering Policies and Procedures on Academic Misconduct – complete Student Code of Conduct here

As an NYU community member, it is your responsibility to know your rights and responsibilities around academic misconduct. Please click here to review the NYU Tandon Student Code of Conduct. Any questions about how this policy relates to this class, please ask your professor.

A. Introduction: The School of Engineering encourages academic excellence in an environment that promotes honesty, integrity, and fairness, and students at the School of Engineering are expected to exhibit those qualities in their academic work. It is through the process of submitting their own work and receiving honest feedback on that work that students may progress academically. Any act of academic dishonesty is seen as an attack upon the School and will not be tolerated. Furthermore, those who breach the School's rules on academic integrity will be sanctioned under this Policy. Students are responsible for familiarizing themselves with the School's Policy on Academic Misconduct.

B. Definition: Academic dishonesty may include misrepresentation, deception, dishonesty, or any act of falsification committed by a student to influence a grade or other academic evaluation. Academic dishonesty also includes intentionally damaging the academic work of others or assisting other students in acts of dishonesty. Common examples of academically dishonest behavior include, but are not limited to, the following:

1. Cheating: intentionally using or attempting to use unauthorized notes, books, electronic media, or electronic communications in an exam; talking with fellow students or looking at another person's work during an exam; submitting work prepared in advance for an in-class examination; having someone take an exam for you or taking an exam for someone else; violating other rules governing the administration of examinations.
2. Fabrication: including but not limited to, falsifying experimental data and/or citations.
3. Plagiarism: intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise; failure to attribute direct quotations, paraphrases, or borrowed facts or information.

4. Unauthorized collaboration: working together on work meant to be done individually (this includes sharing your work with other students for any purpose).
5. Duplicating work: presenting for grading the same work for more than one project or in more than one class, unless express and prior permission has been received from the course instructor(s) or research adviser involved.
6. Forgery: altering any academic document, including, but not limited to, academic records, admissions materials, or medical excuses.

NYU School of Engineering Policies and Procedures on Excused Absences – complete policy here. Students who miss class for any reason should complete this form, through the Office of Student Advocacy. Any questions about what qualifies as an excused absence should email advocacy.tandonstudentlife@nyu.edu. Please note: attendance policies vary from class to class, so please check in with your professor if you have any questions.

A. Introduction: An absence can be excused if you have missed no more than **10 days of school**. If an illness or special circumstance has caused you to miss more than two weeks of school, please refer to the section labeled Medical Leave of Absence.

B. Students may request special accommodations for an absence to be excused in the following cases:

1. Medical reasons
2. Death in immediate family
3. Personal qualified emergencies (documentation must be provided)
4. Religious Expression or Practice

ChatGPT

It is important that the written work required by the course is yours. You should not use ChatGPT or other AI tools for any purpose other than idea generation. Use of these tools is considered academic misconduct.

Deanna Rayment, advocacy.tandonstudentlife@nyu.edu, is the *Director of Student Advocacy & Compliance* and her office handles excused absences and general connection to resources. The Office of Student Advocacy is located in 5 MTC, LC240C and they can assist you should it become necessary or if you have any questions.

Using LockDown Browser for Online Exams

In this course you will have the option of taking exams in person during the Monday 2 to 4:30 time slot or online (with the same time constraints) using the Respondus LockDown Browser. Watch this short video to get a basic

understanding of LockDown Browser and the optional webcam feature (which may be required for some exams).

Then download and install LockDown Browser from this link:

https://download.respondus.com/lockdown/download.php?id=543490690

The Student Quick Start Guide is available at
https://web.respondus.com/student-help/rldb-quick-start-guide-d2l-student/

Finally, when taking an online exam, follow these guidelines:

- Select a location where you won't be interrupted
- Before starting the test, know how much time is available for it, and that you've allotted sufficient time to complete it
- Turn off all mobile devices, phones, etc. and don't have them within reach
- Clear your area of all external materials — books, papers, other computers, or devices
- Remain at your desk or workstation for the duration of the test
- LockDown Browser will prevent you from accessing other websites or applications; you will be unable to exit the test until all questions are completed and submitted

These guidelines will be reviewed and a practice exercise will be posted a week or two before the midterm exam.

NYU School of Engineering Academic Calendar – complete list here. Final exams for graduate courses will be held on the last day of class during the week of Dec 16 – 20, in our case on **Mon Dec 16**. If you have two final exams at the same time, report the conflict to your professors as soon as possible. Also, please pay attention to notable dates such as Add/Drop, Withdrawal, etc.